A DEVICE FOR TRANSFERRING A WORK PIECE FROM A FIRST MACHINE TO A SECOND MACHINE.

Publication number: EP0574397
Publication date: 1993-12-22
Inventor: LILJENGREN JOHN-ERIK (SE); ZITEK JOSEF (SE)
Applicant: VOLVO AB (SE)
Classification:
- international: ***B21D43/10; B23Q1/50; B23Q7/00; B23Q7/04; B65G47/91;*** **B21D43/04; B23Q1/25; B23Q7/00; B23Q7/04; B65G47/91;** (IPC1-7): B30B15/30; B23Q41/02; B25J5/04
- european: B21D43/10B; B23Q1/50; B23Q7/00K; B23Q7/04; B65G47/91D
Application number: EP19920901095 19911213
Priority number(s): WO1991SE00857 19911213; SE19900004006 19901214

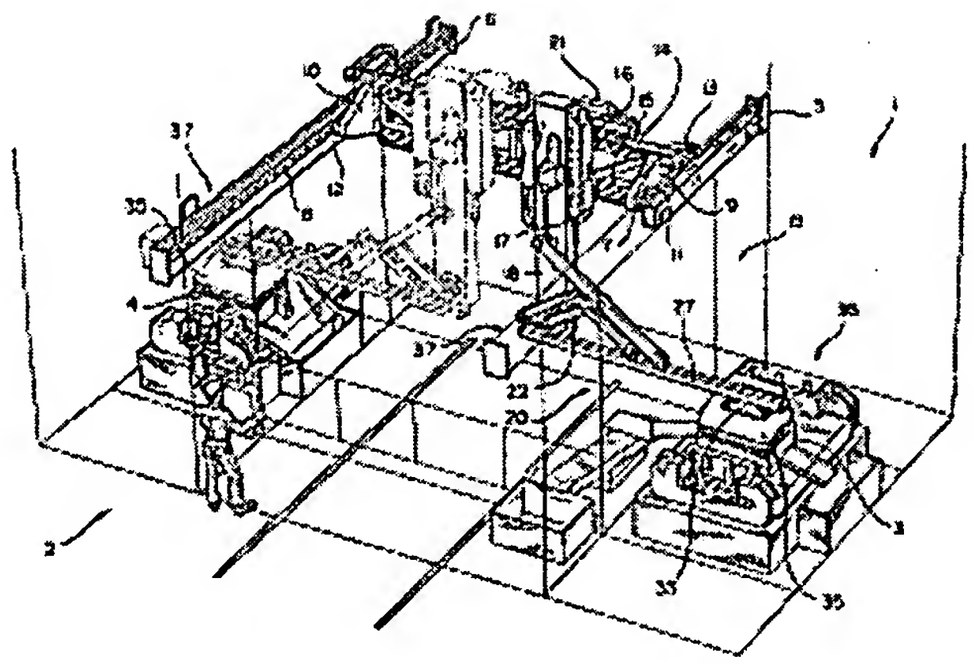
Also published as:
WO9210360 (A1)
US5520502 (A1)
EP0574397 (A0)
EP0574397 (B1)
SK277854B (B6)

more >>

Report a data error here

Abstract not available for EP0574397
Abstract of corresponding document: **US5520502**

PCT No. PCT/SE91/00857 Sec. 371 Date Oct. 4, 1993 Sec. 102(e) Date Oct. 4, 1993 PCT Filed Dec. 7, 1993 PCT Pub. No. WO92/10360 PCT Pub. Date Jun. 25, 1992.A feeder for transferring workpieces from one press to another on a press line includes a carrier device with a linkage whose free, load-carrying end executes a horizontal linear movement on both sides of the carrier. The end of the linkage system is secured in an elongate boom whose longitudinal direction coincides with the linear movement. The boom is provided with a holder device appropriate to the workpieces and movable along the boom by an endless belt which, at the ends of the boom, runs over rollers and which, with the lower part, is secured in the holder device and, with the upper part, in the carder device. The boom is provided with a sliding guide and is supported on the carrier device.



(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 574 397 B1

(12) EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention of the grant of the patent:
22.05.1996 Bulletin 1996/21

(21) Application number: **92901095.7**

(22) Date of filing: **13.12.1991**

(51) Int. Cl.[6]: **B30B 15/30**, B23Q 41/02, B25J 5/04

(86) International application number:
PCT/SE91/00857

(87) International publication number:
WO 92/10360 (25.06.1992 Gazette 1992/14)

(54) A DEVICE FOR TRANSFERRING A WORK PIECE FROM A FIRST MACHINE TO A SECOND MACHINE

VORRICHTUNG ZUM ÜBERTRAGEN EINES WERKSTÜCKES VON EINER ERSTEN ZU EINER ZWEITEN MASCHINE

DISPOSITIF SERVANT A TRANSFERER UNE PIECE A USINER DEPUIS UNE PREMIERE MACHINE A UNE DEUXIEME MACHINE

(84) Designated Contracting States:
BE DE ES FR GB IT NL SE

(30) Priority: **14.12.1990 SE 9004006**

(43) Date of publication of application:
22.12.1993 Bulletin 1993/51

(73) Proprietor: **AB VOLVO**
S-405 08 Göteborg (SE)

(72) Inventors:
- **LILJENGREN, John-Erik**
  S-293 00 Olofström (SE)
- **ZITEK, Josef**
  S-293 00 Olofström (SE)

(74) Representative: **Wallengren, Yngvar**
Patentbyran Y Wallengren AB
Box 116
S-331 01 Värnamo (SE)

(56) References cited:
WO-A-89/02348
DE-A- 2 359 763
SE-B- 452 753
SE-B- 455 682

Printed by Rank Xerox (UK) Business Services
2.11.7/3.4

EP 0 574 397 B1

BNSDOCID: <EP_____0574397B1_I_>

Description

TECHNICAL FIELD

The present invention relates to an apparatus for transferring workpieces from one machine to another, preferably presses, along a path of movement which has at least one substantially linear, preferably approximately horizontal component of movement, and possibly transversely directed, preferably approximately vertical components of movement at the ends thereof, and including a carrier device which, via interconnected parts, carries a holder device for the workpiece.

BACKGROUND ART

Different types of feeder and conveyor equipment are previously known in the art for feeding workpieces to a press, removing the workpieces after completed pressing operation, and then conveying the workpieces for infeed into the next press.

That equipment which is employed in a press line for infeed and removal of workpieces into and out of a press, respectively, is often based on the employment of a linkage system which has a load carrying free end, the linkage system being designed in such a manner that it either per se realizes a path of movement which includes substantially vertical movements at both ends of a linear, horizontal displacement movement, or solely realizes the horizontal displacement movement, while the vertical movements are catered for by raising and lowering of the linkage system proper. An example of such equipment is described in the two Swedish Patent Specifications 7311487-5 and 7910725-6, and in Swedish Patent Application No. 8803440-0.

In such cases in which the distance between two presses included in a press line is great, the above-described infeed and discharge equipment is insufficient to bridge the gap between the presses. In such situations, additional conveyor equipment is required which may be of varying designs and constructions.

The above-described conveyor equipment between the presses included in the press line may function satisfactorily in many situations, but suffers from a number of drawbacks. Thus, several different sets are required of those gripping devices which, in the different working phases, grip and retain the workpiece while on its way from the one press to the other. In addition, equipment placed on the press shop floor entails problems in connection with tool change in the presses, since such equipment must wholly be dismantled and moved aside. Furthermore, desires have been expressed in the art for an increase, in relation to prior art equipment, of both work rate and transport length, so that separate conveyor equipment used between the discharger and infeeder can be omitted.

PROBLEM STRUCTURE

The present invention has for its object to devise an apparatus of the type mentioned by way of introduction, the apparatus being designed in such a manner as to obviate the above-considered problems inherent in prior art equipment. Thus, the present invention is intended to realize an apparatus which takes up no floor space between adjacent presses in a press line. The present invention also relates to an apparatus which displaces an object the shortest path between two points and at high speed. The present invention further relates to an apparatus in which the requirement for a plurality of different sets of gripping and holder devices for the transported object has been eliminated. Finally, the present invention also relates to an apparatus which offers a higher degree of precision than prior art equipment.

SOLUTION

The objects forming the basis of the present invention will be attained if the apparatus intimated by way of introduction is characterized in that the interconnected parts include an elongate boom whose longitudinal direction substantially corresponds to the direction of the linear component of movement and which is movable in its longitudinal direction in relation to the carrier device; and that the holder device is displaceable along the hole lenght of the boom and drivable therealong by first drive means.

According to a first embodiment of the present invention, the carrier device is also suitably provided with a linkage system drivable by second drive means and provided with a free, load-carrying end which describes the linear component of movement, and the boom being secured in this end.

According to a second embodiment of the present invention, the carrier device is also suitably provided, on the one hand, with a guide for displaceable guiding and carrying of the boom and, on the other hand, third drive means for displacing the boom in its longitudinal direction in relation to the guide.

Further advantages will be attained if the apparatus according to the present invention is also given one or more of the characterizing features as set forth in appended Claims 3-5 and 7-14.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

The invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 Is a perspective view of the subject matter of the present invention disposed on two mutually subsequent presses included in a press line; and

Fig. 2 shows, on a larger scale, a section from the right-hand part of Fig. 1.

DESCRIPTION OF PREFERRED EMBODIMENT

While the present invention will be described below as applied in a press line with at least two presses, it is obvious that the invention may generally be reduced into practice in any other type of mechanized equipment in which a workpiece is to be moved from one position to another and deposited there, the transport distance being so great that industrial robots cannot be used.

In Fig. 1, reference numeral 1 relates to a first machine to or from which workpieces 35 are to be fed, preferably a mechanical or hydraulic press with a tool table 3, while reference numeral 2 relates to a second machine or hydraulic press, with tool table 4. Both of the machines or presses may be included, together with a further number of presses, in a press line.

On both of the sides of the presses 1 and 2 facing towards one another, there are provided elongate carrier devices 5 and 6 in the form of beams which are preferably horizontal. The beams 5 and 6 are provided with longitudinal guides 7 and 8, respectively so that carriages 9 and 10, respectively, are displaceably guided along both of the beams 5 and 6. In their opposite ends seen in the direction of travel, the carriages are provided with sliding guides 11 and 12, respectively, and, in addition, bearing trundles 13 in a central region which support the weight of the carriages on both of the beams 5 and 6.

The two carriages 9 and 10 are mutually interconnected with a steering apparatus which has two superposed beams with guide rails 14 and 15. A carriage is displaceably guided along the guide rails 14 and 15 with sliding guides 16 and 17 in cooperation with the two guide rails. The carriage (not shown on the Drawing) is further provided with a guide for mounting a carrier device 18 which supports a linkage system which, for example, may be designed in accordance with the disclosures of our prior Swedish patent application 8803440-0, but which, naturally, may also be of any other appropriate design which satisfies the conditions stipulated below.

Irrespective of how the linkage system 19 is designed in detail, it is crucial according to the present invention that the linkage system have a free, load-carrying end 20 which, when the linkage system is in operation, is displaced linearly, preferably in a horizontal direction.

Possibly, the linkage system per se may be designed in such a manner that it also causes, at both ends of the linear displacement movement, a transversely directed or vertical component of movement, so that a movement cycle begins with a vertical lifting which subsequently transforms into the horizontal displacement, once again reverting to a vertical, downwardly directed movement, and vice versa.

Employing the linkage system 19 according to the present invention will make it possible to realize the vertical component of movement by a raising and lowering of the carrier device 18 in relation to the carriage under the action of a drive motor 21.

As is apparent from Fig. 2, the linkage system 19 includes a drive arm 22 which is journalled in the lower end of the carrier device 18 and which, via a transmission interiorly disposed therein, is drivable by a drive motor 23 between the position shown by solid lines in Fig. 1 and the position shown by ghosted lines. The outer end of the drive arm 22 is pivotally connected to the centre point of an operating arm 24 whose upper end is slidable up and down along a guide 25. The lower end of the operating arm 24 is, via a pivot 26, connected to an elongate boom 27 whose longitudinal direction corresponds to the direction of movement of the load carrying end 20 of the linkage system 19 during its linear, preferably horizontal movement. The boom 27 is furthermore connected via a pivot 28 to a parallelogram arm 29.

On its side facing towards the carrier device 18, the boom 27 has a longitudinal guide which cooperates with a guide roller secured at the lower end of the carrier device 18 and laterally projecting. Since the boom 27 is guided and supported in this manner, on the one hand by the guide roller (not shown) at the lower end of the carrier device 18 and, on the other hand, by both of the pivots 26 and 28, the boom 27 will have three-point suspension, whereby both the precision of the movement of the boom and its load carrying capacity will be improved.

As is apparent from Fig. 2, the boom 27 is provided, at its opposing ends, with rollers 30 and 31 over which a belt 32, a chain, strap or the like is tensioned. Hereby, the belt 32 will have an upper and lower part which extend along the longitudinal direction of the boom 27. The upper part is provided with an anchorage device which is united with the lower end of the carrier device 18, whereby the upper part will remain stationary in relation to the carrier device 18 when the boom 27 is displaced in its longitudinal direction. This implies that the lower part of the belt 32 will move in the same direction as that in which the boom 27 moves, albeit at twice the speed in relation to its surroundings.

The boom is further provided with longitudinal guides for cooperation with a holder 33 so that this is displaceably guided along the length of the boom. The holder 33 is connected to the lower part of the endless belt 32, whereby the holder 33 will be displaced from one end of the boom to the other end, at the same time as the boom 27 per se is displaced in the same direction.

The holder 33 is provided with gripping members 34 appropriate to their purpose, the gripping members being shown on the Drawing as suction cups which are intended to grip and retain a workpiece 35 when this is displaced from the tool 3 of the first press 1 to the tool 4 of the second press 2.

The above-described apparatus operates as illustrated in Fig. 1 in the following manner:
The holder 33 is located at the first end 36 of the boom 27 immediately above the tool 3 of the first press 1, there having gripped the workpiece 35. In this position, the

boom 27 is held stationary in that the drive arm 22 is not subjected to any pivotal movement. Instead, the carrier device 18 is raised in its guides on the carriage (not shown) mounted on the guides 14 and 15. Hereby, the workpiece 35 will be lifted vertically up from the tool 3 a suitable distance.

In this position, the boom 27 is, thus, located with its first end 36 outside the load carrying end 20 of the linkage system 19 in relation to the carrier device 18, while the other end 37 of the boom is supported on the carrier device.

During the final phase of the lifting of the workpiece 35, or only after the lifting operation has been completed, the drive arm 22 is swung in a counterclockwise direction from the position shown by solid lines to the position shown by ghosted lines. In such instance, the boom 27 will be displaced in its longitudinal direction to the left, so that the first end 36 of the boom will be located adjacent and carried by the carrier 18, while the other end 37 of the boom will be located projecting outside the load carrying end 20 of the linkage system 19 if the distance between the tools 3 and 4 is less than the maximum working length through a corresponding adapted pivotal angle for the drive arm 22. If, on the other hand, the distance between the tools is greater than the working range of the boom, the carriage mounting the carrier device 18 is also displaced along the guides until the correct working length has been reached. After completed horizontal displacement - irrespective of how this has taken place - the other end of the boom is located above the tool 4 of the press 2.

During the displacement movement of the boom, the holder 33 has further been displaced along the length of the boom from the first end 36 to the other end 37, so that the holder 33, after completed displacement, is located above the second tool 4. Thereafter, the carrier device 18 is once again lowered and the workpiece is deposited in the tool 4, whereupon the movement chart is followed in the opposite direction.

According to the invention, it is not necessary that the tools 3 and 4 in the two presses be in line with one another, but the subject matter of the present invention is also designed and constructed so as to be capable of managing a lateral displacement (transversely of the major direction of the material flow through the press line). Such a lateral displacement of the workpieces 35 is achieved in that the carriages 9 and 10 are moved along the two beams 5 and 6.

According to the invention, the drive motors (including drive motors 21 and 23) are connected to a control system so that they are capable of achieving, with a high degree of precision, the intended displacement lengths of driven components. It is thus possible to displace the carrier device 18 in the vertical direction between accurately defined end points, but also to displace the carrier device 18 along the guides 14 and 15, also here between accurately established positions. It is correspondingly possible to displace both of the carriages 9 and 10 between positions which have been clearly defined beforehand. Naturally, the angle of pivot of the drive arm 22 may also be adjusted accurately, such that the displacement length of the boom 27 may hereby also accurately be controlled.

DESCRIPTION OF ALTERNATIVE EMBODIMENTS

In the above-described embodiment, use was made of a linkage system 19 for realizing the linear and substantially horizontal component of movement. Furthermore, the linkage system 19 may be designed in such a manner that it, at both ends of the linear component of movement, also causes substantially vertical components of movement.

However, the present invention also includes other versions in which the linear component of movement of the boom 27 is achieved by other means. For example, the carrier device 18 may be provided with a guide which displaceably carries the boom so that this may, in its longitudinal direction, be displaced in the guide. In such instance, the guide is oriented so that the longitudinal direction of the boom is substantially horizontal and parallel with the linear component of movement. In addition, the boom 27 and the guide are designed in such a manner that the boom may be displaced along substantially its entire length from one end position where, in the one direction, it projects out from the guide, via different intermediate positions to a second end position where it substantially completely projects out beyond the guide in the other direction.

In order to realize the movement of the boom 27 in relation to the guide, use may be made of a belt, a chain, a strap or the like which, with its opposing ends, is connected to the boom at the opposite ends thereof. Between its ends, the belt engages with a drive unit disposed on the guide or carrier device 18, this unit engaging, by the intermediary of suitable drive rollers, with the belt for driving the belt and thereby also displacing the boom 27 in the guide so that the boom is shifted with its longitudinal direction substantially parallel to the linear component of movement of the workpiece.

In the same manner as in the above-described embodiments, the boom 27 is further provided, in each end, with a roller over which a belt extends. This belt is, on the one hand, connected to the guide or carrier device 18 and, on the other hand, to the holder 33 which is employed to grip and retain the workpiece 35. The arrangement with the belt connected to the holder is such that the holder moves in the same direction as the boom, but at twice the speed of the boom.

Analogous with that described above, use may be made, instead of the belt for driving the holder, of other suitable drive means such as hydraulic or pneumatic cylinders, electric linear motors, ball bearing screws, and so on.

In order to realize vertical components of movement in the embodiment now under discussion, the guide carrying the boom may be raisable and lowerable along the carrier device 18 and drivable in a vertical direction by

suitable drive means, possibly including a belt, suitable guide rollers and at least one drive roller connected to a drive motor. Other types of drive means may of course also be applicable in this context, including gear racks, ball bearing screws, cylinder assemblies and the like.

Another alternative for realizing the vertical movement also resides in the possibility of rendering the entire carrier device 18 raisable and lowerable and operable in this direction under the action of suitable drive means.

While the above-described drive means for the holder 33 in the form of the endless belt 32 enjoys major advantages, it is possible, as alternatives in all embodiments, to employ for instance ball bearing screws, hydraulic or pneumatic cylinder assemblies with or without rams, and so on. Furthermore, the connection of the belt 32 with the carrier 18 may, of course, be dispensed with and the belt instead be given a separate drive unit which is carried by the boom 27.

According to the present invention, a transversely-directed movement of the workpiece 35 may also be realized by providing, on the holder 33, a transversely-directed (preferably at right angles to the longitudinal direction of the boom 27) sliding guide whose moving portion carries gripping members corresponding to the suction cups 34. The employment of such a transversely directed guide may replace the shifting of the carriages 9 and 10 along both of the beams 5 and 6.

It is further possible to place, between the holder 33 and a part carrying suitable gripping members 34, an adjustment device which permits rotation or tilting of this part about one or more axes in relation to the holder. Thus, a pivot device with vertical pivotal axis may be employed in a situation when the presses are not in alignment with one another. In such a situation, no displacement of the carriage 9 need take place if, instead, the boom 27 is directed with its longitudinal direction and direction of movement along the "oblique" direction of transport of the workpiece, and this is pivoted about the vertical axis during its transport.

According to the invention, it is further possible to employ two holders 33 on each boom 27 and to place, on these holders, equipment for transferring the workpiece from the one holder to the other, possibly at the same time as the workpiece is tilted or turned.

One further alternative to the lateral displacement which is realized by shifting of the carriages 9 and 10 along the beams 5 and 6 may be achieved in that the guide arrangement 14, 15 is obliquely directed in relation to the major direction of the material flow along the press line. Such an oblique disposition of the guide arrangement could be achieved, for example, in that only one of the carriages 9 and 10 is laterally displaced, while the other is retained in position. The guide arrangement is in such a version, pivotally connected to the carriages 9 and 10, the pivot axes being vertical. Furthermore, the connection between the carriages and the guide arrangement or arrangements is per se designed such that a longitudinal alteration in the longitudinal direction of the guide arrangement can be realized.

According to the present invention, it is not necessary to employ the beams 5 and 6 carried by the presses 1 and 2, but these beams may instead be placed on a separate frame carried on the substrate or be disposed on a carriage drivable over the substrate. Furthermore, the beams 5 and 6, as well as the carriages 9 and 10, may be wholly dispensed with if, instead, the guide arrangement 14 and 15 is mounted on a carriage drivable over the substrate.

The present invention may be further modified without departing from the scope of the appended Claims.

Claims

1. An apparatus for transferring a workpiece from a first machine to a second machine, preferably presses (1, 2), along a path of movement which has at least one substantially linear, preferably approximately horizontal component of movement and possibly transversely-directed, preferably approximately vertical components of movement at the ends thereof, including a carrier device (18) which, via interconnected parts (19, 27), carries a holder device (33, 34) for the workpiece (35), **characterized** in that the interconnected parts include an elongate boom (27) whose longitudinal direction substantially corresponds to the direction of the linear component of movement and which is movable in its longitudinai direction in relation to the carrier device, and that the holder device (33, 34) is displaceable along the whole lenght of the boom (27) and drivable therealong by first drive means (32).

2. The apparatus as claimed in claim 1, **characterized** in that the carrier device (18) is provided with a linkage system (19) drivable by second drive means (23) and with a free, load-carrying end (20) which executes the linear component of movement; and that the boom (27) is secured in this end.

3. The apparatus as claimed in claim 2, **characterized** in that the linkage system (19) is secured in a central region of the boom (27); and that the boom is slidably guided and supported on the carrier device (18), whereby a fist end portion (36) of the boom in the one end position of the linkage system (19) in relation to the carrier device (18) if located outside the load carrying end (20) of the linkage system, while the other end portion (37) of the boom is supported by the carrier device and, in the second end position of the linkage system, the other end portion (37) of the boom in realtion to the carrier device is located outside the load-carrying end (20) of the linkage system, while the first end portion (36) of the boom is supported by the carrier device.

4. The apparatus as claimed in any one of claims 2 or 3, **characterized** in that the linkage system (19) is designed to append, to both ends of the linear, pref-

erably horizontal path of movement, transversely-directed, preferably vertical paths of movement.

5. The apparatus as claimed in any one of claims 2 or 3, **characterized** in that the carrier device (18) is raisably and lowerably disposed on a guide arrangement (14, 15) for appending, to both ends of the linear preferably horizontal path of movement, transversely-directed, preferably vertical paths of movement.

6. The apparatus as claimed in claim 1, **characterized** in that the carrier device (18) is provided, on the one hand, with a guide for shiftable guiding and carrying of the boom (27), and, on the other hand, with third drive means for displacing the boom (27) in its longitudinal direction in relation to the guide.

7. The apparatus as claimed in claim 6, **characterized** in that said third drive means includes a strap, a belt, a chain or the like which is secured in the regions of the opposing ends of the boom (27) and which, by the intermediary of drive wheels disposed on the carrier (18), is drivable by a drive motor, whereby the boom is displaceable from one position in which one end of the boom is located adjacent one end of the guide, to a second position in which the opposing end of the boom is located adjacent the opposing end of the guide.

8. The apparatus as claimed in any one of claims 6 or 7, **characterized** in that the carrier device (18) is raisably and lowerably disposed on a guide arrangement (14, 15) for appending, to both ends of the linear preferably horizontal path of movement, transversely-directed, preferably vertical paths of movement.

9. The apparatus as claimed in any one of claims 1 to 8, **characterized** in that said first drive means includes a belt (32), a strap, a chain or the like which, with its parts, extends in the longitudinal direction of the boom (27) and is passed about rollers (30, 31) located at the opposing ends (36, 37) of the boom, the one part of the belt being connected to the carrier device (18) or the guide, while the second part of the belt is connected to the holder device (33, 34) for displacement thereof along the boom and in the same direction as that in which the boom moves.

10. The apparatus as claimed in any one of claims 1 to 9, **characterized** in that a guide arrangement (14, 15) extends substantially parallel to the linear, preferably horiontal path of mevement and is, at its opposing ends, carried by carrier members (5, 6) which are secured on the presses (1, 2) or separate frames; and that the carrier device (18) is mounted on the guide arrangement (14, 15).

11. The apparatus as claimed in claim 10, **characterized** in that the carrier device (18) is displaceable along the guide arrangement (14, 15).

12. The apparatus as claimed in any one of claims 10 or 11, **characterized** in that the carrier members (5, 6) are transversely directed, preferably at right angles, to that direction along which the boom (27) moves, and are substantially parallel to one another.

13. The apparatus as claimed in any one of claims 10 to 12, **characterized** in that the guide arrangement (14, 15) is obliquely inclinable in the lateral direction in order realize a lateral displacement of a transported object (35).

14. The apparatus as claimed in any one of claims 10 to 13, **characterized** in that the frame for carrying said carrier members (5, 6) is designed as a carriage drivable into the space between two closely adjacent presses (1, 2).

Patentansprüche

1. Vorrichtung zur Übertragung eines Werkstücks von einer ersten Maschine zu einer zweiten Maschine, vorzugsweise Pressen (1, 2), entlang eines Bewegungswegs mit mindestens einer im wesentlichen linearen, vorzugsweise in etwa horizontalen Bewegungskomponente und möglicherweise transversal gerichteten, vorzugsweise in etwa vertikalen Bewegungskomponenten an den Enden hiervon, mit einer Trägereinrichtung (18), welche über miteinander verbundene Teile (19, 27) eine Halteeinrichtung (33, 34) für das Werkstück (35) trägt, dadurch **gekennzeichnet**, daß die miteinander verbundenen Teile einen länglichen Ausleger (27) aufweisen, dessen Längsrichtung im wesentlichen der Richtung der linearen Bewegungskomponente entspricht, und welcher in seiner Längsrichtung in bezug auf die Trägereinrichtung bewegbar ist; und daß die Halteeinrichtung (33, 34) entlang der gesamten Länge des Auslegers (27) versetzbar ist und durch ein erstes Antriebsmittel (32) entlang davon antreibbar ist.

2. Vorrichtung gemäß Anspruch 1, dadurch **gekennzeichnet**, daß die Trägereinrichtung (18) mit einem Verbindungssystem (19) versehen ist, welches durch eine zweites Antriebsmittel (23) antreibbar ist und ein freies, lasttragendes Ende (20) aufweist, weiches die lineare Bewegungskomponente ausführt; und daß der Ausleger (27) in diesem Ende festgehalten ist.

3. Vorrichtung gemäß Anspruch 2, dadurch **gekennzeichnet**, daß das Verbindungssystem (19) in einem zentralen Bereich des Auslegers (27) festgehalten ist; und daß der Ausleger auf der Trägerein-

richtung (18) getragen und gleitbar geführt ist, wobei ein erster Endbereich (36) des Auslegers in der einen Endposition des Verbindungssystems (19) in bezug auf die Trägezeinrichtung (18) sich außerhalb des lasttragenden Endes (20) des Verbindungssystems befindet, während der andere Endbereich (37) des Auslegers durch die Trägereinrichtung gehalten ist, und in der zweiten Endposition des Verbindungssystems der andere Endbereich (37) des Auslegers in bezug auf die Trägereinrichtung sich außerhalb des lasttragenden Endes (20) des Verbindungssystems befindet, während der erste Endbereich (36) des Auslegers durch die Trägereinrichtung getragen ist.

4. Vorrichtung gemäß einem der Ansprüche 2 oder 3, dadurch **gekennzeichnet**, daß das Verbindungssystem (19) darauf ausgerichtet ist, beiden Enden des linearen, vorzugsweise horizontalen Bewegungswegs transversal gerichtete, vorzugsweise vertikale Bewegungswege hinzuzufügen.

5. Vorrichtung gemäß einem der Ansprüche 2 oder 3, dadurch **gekennzeichnet**, daß die Trägereinrichtung (18) erhöhbar und senkbar an einer Führungsanordnung (14, 15) angeordnet ist, um beiden Enden des linearen, vorzugsweise horizontalen Bewegungswegs transversal gerichtete, vorzugsweise vertikale Bewegungswege hinzuzufügen.

6. Vorrichtung gemäß Anspruch 1, dadurch **gekennzeichnet**, daß die Trägereinrichtung (18) einerseits mit einer Führung zum gleitbaren Führen und Tragen des Auslegers (27), und andererseits mit einem dritten Antriebsmittel zum Versetzen des Auslegers (27) in dessen Längsrichtung in bezug auf die Führung versehen ist.

7. Vorrichtung gemäß Anspruch 6, dadurch **gekennzeichnet**, daß das dritte Antriebsmittel einen Gurt, einen Riemen, eine Kette oder ähnliches aufweist, was in den Bereichen der gegenüberliegenden Enden des Auslegers (27) festgehalten ist, und was mittels auf dem Träger (18) angeordneter Antriebsräder durch einen Antriebsmotor antreibbar ist, wodurch der Ausleger von einer Position, in welcher ein Ende des Auslegers sich neben einem Ende der Führung befindet, zu einer zweiten Position, in welcher das gegenüberliegende Ende des Auslegers sich neben dem gegenüberliegenden Ende der Führung befindet, versetzbar ist.

8. Vorrichtung gemäß einem der Ansprüche 6 oder 7, dadurch **gekennzeichnet**, daß die Trägereinrichtung (18) erhöhbar und senkbar an einer Führungsanordnung (14, 15) angeordnet ist, um beiden Enden des linearen, vorzugsweise horizontalen Bewegungswegs transversal gerichtete, vorzugsweise vertikale Bewegungswege hinzuzufügen.

9. Vorrichtung gemäß einem der Ansprüche 1 bis 8, dadurch **gekennzeichnet**, daß das erste Antriebsmittel einen Riemen (32), einen Gurt, eine Kette oder ähnliches aufweist, was sich mit dessen Teilen in Längsrichtung des Auslegers (27) erstreckt und um an den gegenüberliegenden Enden (36, 37) des Auslegers angeordnete Walzen (30, 31) bewegt, wobei der eine Teil des Riemens mit der Trägereinrichtung (18) oder der Führung verbunden ist, während der zweite Teil des Riemens mit der Halteeinrichtung (33, 34) zur Versetzung hiervon entlang des Auslegers und in derselben Richtung wie jener, in welcher sich der Ausleger bewegt, verbunden ist.

10. Vorrichtung gemäß einem der Ansprüche 1 bis 9, dadurch **gekennzeichnet**, daß sich eine Führungsanordnung (14, 15) im wesentlichen parallel zum linearen, vorzugsweise horizontalen Bewegungsweg erstreckt, und an den gegenüberliegenden Enden durch Trägerelemente (5, 6) getragen ist, welche auf den Pressen (1, 2) oder separaten Rahmen festgehalten sind; und daß die Trägereinrichtung (18) auf der Führungsanordnung (14, 15) angebracht ist.

11. Vorrichtung gemäß Anspruch 10, dadurch **gekennzeichnet**, daß die Trägereinrichtung (18) entlang der Führungsanordnung (14, 15) versetzbar ist.

12. Vorrichtung gemäß einem der Ansprüche 10 oder 11, dadurch **gekennzeichnet**, daß die Trägerelemente (5, 6) transversal gerichtet, vorzugsweise rechtwinklig, zu der Richtung sind, entlang welcher sich der Ausleger (27) bewegt, und im wesentlichen parallel zueinander sind.

13. Vorrichtung gemäß einem der Ansprüche 10 bis 12, dadurch **gekennzeichnet**, daß die Führungsanordnung (14, 15) in seitlicher Richtung schräg neigbar ist, um eine seitliche Versetzung eines transportierten Gegenstandes (35) auszuführen.

14. Vorrichtung gemaß einem der Ansprüche 10 bis 13, dadurch **gekennzeichnet**, daß der Rahmen zum Tragen der Trägerelemente (5, 6) als Schlitten ausgeführt ist, welcher in den Raum zwischen zwei eng nebeneinanderliegenden Pressen (1, 2) antreibbar ist.

Revendications

1. Dispositif pour transférer une pièce à usiner depuis une première machine vers une seconde machine, de préférence des presses (1, 2), le long d'un trajet de mouvement qui a au moins une composante de mouvement substantiellement linéaire, de préférence approximativement horizontale et éventuellement dirigée transversalement, des composantes

de mouvement de préférence approximativement verticales à ses extrémités, comprenant un dispositif de support (18) qui, via des parties interconnectées (19, 27), supporte un dispositif de fixation (33, 34) pour la pièce à usiner (35), caractérisé en ce que les parties interconnectées comprennent un bras allongé (27) dont la direction longitudinale correspond substantiellement à la direction de la composante de mouvement linéaire et qui est mobile dans sa direction longitudinale par rapport au dispositif de support ; et en ce que le dispositif de fixation (33, 34) peut être déplacé le long de la longueur entière du bras (27) et peut être commandé le long de celui-ci par des premiers moyens de commande (32).

2. Dispositif selon la revendication 1, caractérisé en ce que le dispositif de support (18) est pourvu d'un système de liaison (19) qui peut être commandé par des seconds moyens de commande (23) et avec une extrémité portante (20), libre, qui exécute la composante de mouvement linéaire ; et en ce que le bras (27) est fixé dans cette extrémité.

3. Dispositif selon la revendication 2, caractérisé en ce que le système de liaison (19) est fixé dans une région centrale du bras (27) ; et en ce que le bras est guidé de manière à pouvoir coulisser, et supporté sur le dispositif de support (18), par quoi une première partie d'extrémité (36) du bras dans la première position d'extrémité du système de liaison (19) par rapport au dispositif de support (18) est située endehors de l'extrémité portante (20) du système de liaison, tandis que l'autre partie d'extrémité (37) du bras est supportée par le dispositif de support et, dans la seconde position d'extrémité du système de liaison, l'autre partie d'extrémité (37) du bras par rapport au dispositif de support est située en-dehors de l'extrémité portante (20) du système de liaison, tandis que la première partie d'extrémité (36) du bras est supportée par le dispositif de support.

4. Dispositif selon la revendication 2 ou 3, caractérisé en ce que le système de liaison (19) est conçu pour s'attacher, aux deux extrémités du trajet de mouvement linéaire, de préférence horizontal, dirigé transversalement, des trajets de mouvement de préférence verticaux.

5. Dispositif selon la revendication 2 ou 3, caractérisé en ce que le dispositif de support (18) est agencé de manière à pouvoir être élevé et abaissé sur un dispositif de guidage (14, 15) pour s'attacher, aux deux extrémités du trajet de mouvement linéaire, de préférence horizontal, dirigé transversalement, des trajets de mouvement de préférence verticaux.

6. Dispositif selon la revendication 1, caractérisé en ce que le dispositif de support (18) est pourvu, d'une part, d'un dispositif de guidage pour un guidage et un support mobiles du bras (27) et, d'autre part, de troisièmes moyens de commande pour déplacer le bras (27) dans sa direction longitudinale par rapport au dispositif de guidage.

7. Dispositif selon la revendication 6, caractérisé en ce que lesdits troisièmes moyens de commande comprennent une sangle, une courroie, une chaîne ou similaire qui est fixée dans les régions des extrémités opposées du bras (27) et qui, par l'intermédiaire de roues de commande placées sur le support (18), peut être commandée par un moteur de commande, par quoi le bras peut être déplacé d'une première position dans laquelle une extrémité du bras est située contiguë à une extrémité du dispositif de guidage, vers une seconde position dans laquelle l'extrémité opposée du bras est située contiguë à l'extrémité opposée du dispositif de guidage.

8. Dispositif selon la revendication 6 ou 7, caractérisé en ce que le dispositif de support (18) est placé de manière à pouvoir être élevé et abaissé sur un dispositif de guidage (14, 15) pour s'attacher aux deux extrémités du trajet de mouvement linéaire, de préférence horizontal, dirigé transversalement, des trajets de mouvement de préférence verticaux.

9. Dispositif selon l'une quelconque des revendications 1 à 8, caractérisé en ce que lesdits premiers moyens de commande comprennent une sangle, une courroie, une chaîne ou similaire qui, avec ses parties, s'étend dans la direction longitudinale du bras (27) et qui est passée autour de rouleaux (30, 31) situés aux extrémités opposées (36, 37) du bras, la première partie de la courroie étant reliée au dispositif de support (18) ou au dispositif de guidage, tandis que la seconde partie de la courroie est reliée au dispositif de fixation (33, 34) pour son déplacement le long du bras et dans la même direction que celle dans laquelle le bras se déplace.

10. Dispositif selon l'une quelconque des revendications 1 à 9, caractérisé en ce qu'un dispositif de guidage (14, 15) s'étend substantiellement parallèle au trajet de mouvement linéaire, de préférence horizontal et est, à ses extrémités opposées, supporté par des éléments de support (5, 6) qui sont fixés sur les presses (1, 2) ou sur des bâtis séparés ; et en ce que le dispositif de support (18) est monté sur le dispositif de guidage (14, 15).

11. Dispositif selon la revendication 10, caractérisé en ce que le dispositif de support (18) peut être déplacé le long du dispositif de guidage (14, 15).

12. Dispositif selon la revendication 10 ou 11, caractérisé en ce que les éléments de support (5, 6) sont dirigés transversalement, de préférence à angles droits, par rapport à la direction le long de laquelle

le bras (27) se déplace, et sont substantiellement parallèles l'un à l'autre.

13. Dispositif selon la revendication 10 ou 12, caractérisé en ce que le dispositif de guidage (14, 15) est inclinable obliquement dans la direction latérale afin de réaliser un déplacement latéral d'un objet transporté (35).

14. Dispositif selon l'une quelconque des revendications 10 à 13, caractérisé en ce que le bâti pour supporter lesdits éléments de support (5, 6) est conçu comme un chariot pouvant être commandé dans l'espace compris entre deux presses étroitement contiguës (1, 2).

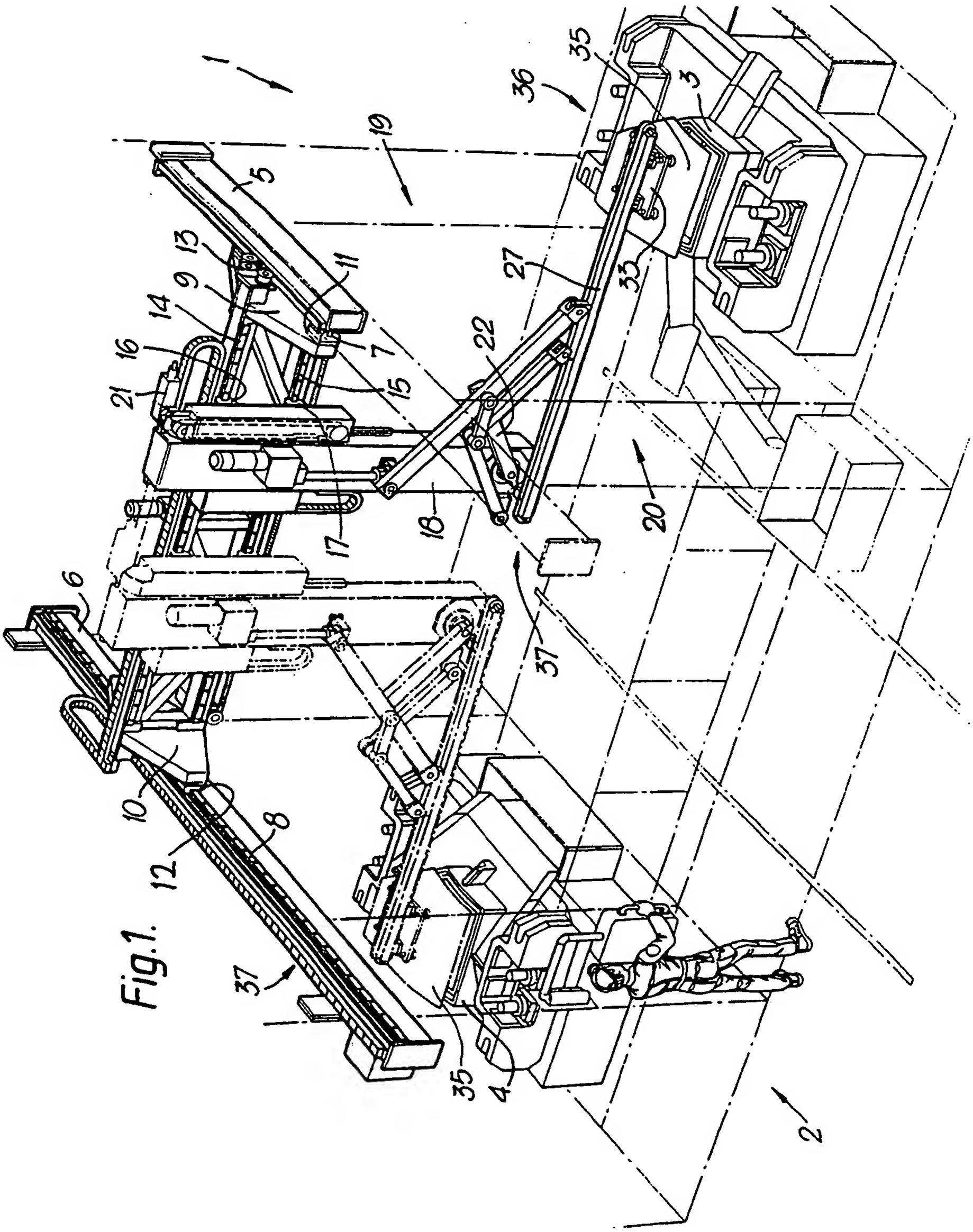


Fig.1.

Fig.2.